

## CLAIMS

1. A method for filling forms, comprising the steps of:

5        matching user submitted information with a stored profile of said user when said user submits a form;

      tagging a field of recognized data within said submitted information with a corresponding type in said stored profile if a match is discovered; and

      using a resulting profile to help all subsequent users to fill the same form.

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2. An apparatus for filling forms, comprising:

      a form fill engine for analyzing a context of a users' navigation, and completing a form upon users' consent or user initiated actions, wherein said form fill engine pulls user data and rules to map said data to a requested form; and

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      a reverse mapping engine for implementing a reverse mapping algorithm, wherein after said form fill engine recognizes a match, extracted knowledge from said match is communicated to a reverse mapping server for storage into a reverse mapping database;

      wherein a resulting profile is used to help all subsequent users to fill the same

20 form.

3. The apparatus of Claim 2, further comprising:

      a site profile server for providing information about a mapping of a site currently visited by said user from a site profile database and for connecting to a 25 user data server to get a user's profile from a user database.

4. The apparatus of Claim 3, further comprising:

      a consensus engine for monitoring statistics of reverse mappings, wherein after passing a predetermined statistical level of consensus said consensus engine 30 decides whether a mapping is accurate, and triggers migration of a mapping from said reverse mapping database to said site profile database.

- 5. A method for reverse auto-profiling in a form fill application, comprising the steps of:
  - for every form a user submits, collecting field names and corresponding values said user has entered;

5 comparing values with a same user's data found in a central subscription service database;

if a match between submitted data and said user's profile is found, considering this as a hit and, after that, marking a name of a hit field according to a type of said user's data that matches;

10 repeating the above steps until a statistically reliable confidence level about a real meaning of said fields is reached; and

thereafter, migrating said form to a mapped status;

wherein all subsequent users using said same form thereafter receive service based on a profile built by learning from an initial set of users.

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- 6. A method for reverse auto-correcting in a form fill application, comprising the steps of:
  - for every form automatically filled, observing whether a user introduces corrections after a form fill operation is completed for a particular site;

20 trying to match corrections with knowledge about user specific data;.

if a match is found, considering it a hit;

re-mapping a field that was corrected; and

after a statistically significant number of corrections are introduced, migrating corrections to a profile of said site.

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- 7. A caching method for a form fill application, comprising the steps of:
  - a client maintaining a cache of form fill mapping data that it receives from a site profile server;

30 said client maintaining an index of all domains for which said site profile server has form fill mapping data, wherein said index is identified by a version number and contains a record for each domain supported;

1 said client periodically polling said site profile server to identify differences  
between an index version at said client and a most recent index;

2 said client using said differences to update said client's local index; and

5 removing form fill mapping data for a domain stored in said cache, if it was  
present, when said differences indicate that a mapping for said domain has changed.

8. The method of Claim 7, further comprising the steps of:

10 while said client is used for browsing, said client checking to see if it has  
mapping data for each domain it visits;

15 if said client navigates to a domain for which it has form fill mapping data, said  
client operating under an assumption that form fill mapping data that it has for said  
domain is the most current available, and said client proceeding to use said form fill  
mapping data to recognize checkout forms and offer to fill them; and

20 if said client navigates to a domain for which it does not have form fill mapping  
data, said requesting form fill mapping data for said domain from said site profile  
server, and said client storing said form fill mapping data in said cache when said  
data are received.

25 9. A method for downloading a user's profile in a reverse mapping form fill  
application without challenging said user with a higher level of authentication,  
comprising the steps of:

30 encrypting said user profile with a user specific symmetric key, stored in a  
user database; and

35 storing said encrypted profile on said user's system after a first time said user  
authenticates with a higher-level authentication from said system.

40 10. A method for downloading a user's profile in a reverse mapping form fill  
application without challenging said user with a higher level of authentication,  
comprising the step of:

45 using less than every character from said user profile when downloading said  
user profile;

wherein only a subset of said user profile is potentially revealed, while sufficient confidence is obtained in said user profile to generate a reverse mapping.

11. A method for maintaining privacy with regard to a user's profile in a reverse mapping form fill application, comprising the steps of:

5 generating a large, random number token at a server, said server signing said token with a certificate, and storing said token persistently on said user's system a first time said user authenticates with a second level password;

10 flagging said user to prevent issuing of multiple tokens for a same user;

wherein the random number used in said token assures that real user identities are not traceable; and

15 wherein communications are identifiable for unique users without knowing an actual identity of said users themselves.

12. The method of Claim 11, wherein said token and signature are included in all communications between said user and a reverse mapping server.

13. A method for downloading a user's profile in a reverse mapping form fill application, comprising the steps of:

20 associating user data with form field data;

storing only transformed user data items and not actual user data;

normalizing all data before performing said transformation;

25 communicating said transformation format to a reverse mapping server along with an associated field type so that it can later be used by a form fill engine to fill said form by formatting said data in a way said form expects;

using an intelligent form fill technique to make guesses about the presence of forms and field meanings when a mapping for a form is unavailable from a site profile server; and

30 including information about field type from said intelligent form fill technique along with reverse mapping information sent to said reverse mapping server.

14. An apparatus for filling forms, comprising:

a module for matching user submitted information with a stored profile of said user when said user submits a form;

a module for tagging a field of recognized data within said submitted information with a corresponding type in said stored profile if a match is discovered;

5 and

a module for using a resulting profile to help all subsequent users to fill the same form.

15. A method for filling forms, comprising the steps of:

10 analyzing a context of a users' navigation, and completing a form upon users' consent or user initiated actions, wherein a form fill engine pulls user data and rules to map said data to a requested form; and

implementing a reverse mapping algorithm, wherein after said form fill engine recognizes a match, extracted knowledge from said match is communicated to a 15 reverse mapping server for storage into a reverse mapping database;

wherein a resulting profile is used to help all subsequent users to fill the same form.

16. The method of Claim 15, further comprising the step of:

20 providing information about a mapping of a site currently visited by said user from a site profile database and for connecting to a user data server to get a user's profile from a user database.

17. The method of Claim 15, further comprising the step of:

25 monitoring statistics of reverse mappings, wherein after passing a predetermined statistical level of consensus said consensus engine decides whether a mapping is accurate, and triggers migration of a mapping from said reverse mapping database to said site profile database.

30 18. An apparatus for reverse auto-profiling in a form fill application, comprising:

a module for collecting field names and corresponding values said user has entered for every form a user submits;

a module for comparing values with a same user's data found in a central subscription service database;

a module for considering this as a hit and, after that, marking a name of a hit field according to a type of said user's data that matches, if a match between submitted data and said user's profile is found;

a module for generating a statistically reliable confidence level about a real meaning of said fields is reached; and

a module for migrating said form to a mapped status;

wherein all subsequent users using said same form thereafter receive service

10 based on a profile built by learning from an initial set of users.

19. An apparatus for reverse auto-correcting in a form fill application, comprising:

a module for observing whether a user introduces corrections after a form fill operation is completed for a particular site for every form automatically filled;

15 a module for trying to match corrections with knowledge about user specific data, wherein if a match is found, said module considering it a hit;

a module for re-mapping a field that was corrected; and

a module for migrating corrections to a profile of said site after a statistically significant number of corrections are introduced.

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20. A caching apparatus for a form fill application, comprising:

a client-based cache of form fill mapping data that said client receives from a site profile server;

25 an index maintained at said client of all domains for which said site profile server has form fill mapping data, wherein said index is identified by a version number and contains a record for each domain supported;

a mechanism at said client for periodically polling said site profile server to identify differences between an index version at said client and a most recent index;

30 a module at said client for using said differences to update said client's local index; and

a module for removing form fill mapping data for a domain stored in said cache, if it was present, when said differences indicate that a mapping for said domain has changed.

5 21. The apparatus of Claim 20, further comprising:

a module associated with said client for checking to see if it has mapping data for each domain it visits, while said client is used for browsing;

wherein if said client navigates to a domain for which it has form fill mapping data, said client operating under an assumption that form fill mapping data that it has

10 for said domain is the most current available, and said client proceeding to use said form fill mapping data to recognize checkout forms and offer to fill them; and

wherein if said client navigates to a domain for which it does not have form fill mapping data, said requesting form fill mapping data for said domain from said site profile server, and said client storing said form fill mapping data in said cache when  
15 said data are received.

22. An apparatus for downloading a user's profile in a reverse mapping form fill application without challenging said user with a higher level of authentication, comprising:

20 a module for encrypting said user profile with a user specific symmetric key, stored in a user database; and

a memory storing said encrypted profile on said user's system after a first time said user authenticates with a higher-level authentication from said system.

25 23. An apparatus for downloading a user's profile in a reverse mapping form fill application without challenging said user with a higher level of authentication, comprising:

a module for using less than every character from said user profile when downloading said user profile;

30 wherein only a subset of said user profile is potentially revealed, while sufficient confidence is obtained in said user profile to generate a reverse mapping.

- 24. An apparatus for maintaining privacy with regard to a user's profile in a reverse mapping form fill application, comprising:
  - a pseudo-random number generator for generating a large, random number token at a server;
  - 5 a module associated with said server for signing said token with a certificate;
  - a memory for storing said token persistently on said user's system a first time said user authenticates with a second level password;
  - a module for flagging said user to prevent issuing of multiple tokens for a same user;
- 10 wherein the random number used in said token assures that real user identities are not traceable; and
  - wherein communications are identifiable for unique users without knowing an actual identity of said users themselves.
- 15 25. The apparatus of Claim 24, wherein said token and signature are included in all communications between said user and a reverse mapping server.
- 26. An apparatus for downloading a user's profile in a reverse mapping form fill application, comprising:
  - 20 means for associating user data with form field data;
  - a memory for storing only transformed user data items and not actual user data;
  - means for normalizing all data before performing said transformation;
  - means for communicating said transformation format to a reverse mapping
- 25 server along with an associated field type so that it can later be used by a form fill engine to fill said form by formatting said data in a way said form expects;
- an intelligent form fill module for making guesses about the presence of forms and field meanings when a mapping for a form is unavailable from a site profile server; and
- 30 means for including information about field type from said intelligent form fill technique along with reverse mapping information sent to said reverse mapping server.